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Description

The present invention relates to depilatory devices for removing body hair, such as are used for cosmetic purposes.

A number of depilatory devices for this purpose have been proposed in the past. Some devices include discs arranged to provide gaps of wedge-like configuration for catching and plucking the hair; a device of this type is illustrated by U.S. Patent 2,900,661. Other devices include helical springs which define the hair-catching gaps between their windings; examples of the latter are described in U.S. Patents 1 232 617, 4 079 741 and 4 524 772 (corresponding EP-A 0 101 656), the first two being axial helical springs, and the latter one being an arcuate spring.

An object of the present invention is to provide a depilatory device which uses neither discs nor helical springs but defines the hair-catching gaps in another manner, producing a number of advantages over the prior devices as will be described more particularly below.

More particularly, EP-A 0 101 656 discloses a depilatory device for removing body hair, comprising: a manually-grippable housing and a flexible hair-plucker body of cylindrical contour mounted for rotation about its longitudinal axis to said housing; said hair-plucker body being supported with its longitudinal axis disposed arcuately and having and exposed section formed with a plurality of gaps in its outer surface which during rotation of said hair-plucking body and its movement over a surface from which hair is to be removed, are open at the convex side of said section to receive the hairs in the gaps and are closed at the concave side to catch, pluck-out and then eject the hairs.

The hair-plucker body described in this European document is a helical spring in which the windings form the gaps for catching the hairs, the windings being spaced apart at the convex side of the arc and being pressed together at the concave side. In such a construction, the windings engage the hairs at concentrated surfaces or points on the hairs, thereby applying very high localized forces which may crush and sever hairs, rather than pluck them by their roots. In addition, the windings form continuously open V-shaped gaps during the rotation of the helical spring, which gaps tend to catch bunches of hairs by a wedging action and to pluck them at one time, which can be very painful.

According to the present invention, there is provided a depilatory device as described above, characterised in that the hair-plucker body is a cylindrical member of plastic material having a smooth outer surface; and that the gaps are defined by a plurality of slits each penetrating only partially through, and extending circumferentially of, the hair-plucker body.

In such a construction, the gaps are defined by the sides of the slits which engage a substantial length of the hairs, rather than concentrated points on the hairs; such a construction, therefore, is more effective to pluck the hairs with their roots, rather than sever them leaving the roots in place.

Another very important advantage is that the plastic cylindrical member provides a softer feel to the skin than the helical spring which, as a practical matter and in the commercial form, is of metal.

Further, the plastic cylindrical member applied against the skin, rather than a metal helical spring, reduces the danger of electrical shock when the device is electrically operated, and thereby obviates the need and expense for stepping-down the line voltage if the device is to be connected to the line. A still further advantage is that the plastic cylindrical member may be manufactured in volume and at low cost, for example by extrusion, and therefore significantly reduces the overall cost of the device.

Each of the slits formed in the outer surface of the cylindrical member preferably extends for less than the complete circumference of the member; a preferred range is from one-fourth to one-half its circumference. In such a construction, the gaps formed by the slits are alternately opened and closed during each rotation of the cylindrical member. In addition, the cylindrical member forms relatively large skin-contacting surfaces separated by relatively narrow spaces in between, as compared to the helical spring construction which form relatively narrow skin-contacting surfaces separated by relatively large spaces in between. Further, the gaps produced by the slits are spaced from each other both circumferentially and axially of the cylindrical member. These features substantially increase the tendency of the cylindrical member to catch individual hairs, rather than bunches of hairs, thereby substantially reducing the pain caused by the device as compared to the helical spring construction. These features also enable the pain to be controlled, by controlling the lengths and densities of the slits, as desired, which is also not possible as a practical matter in the helical spring construction.

The use of discrete, discontinuous slits, rather than continuous slits, has also been found to substantially reduce the possibility of plucked hairs becoming wedged in the slits and not being ejected when the slits open at the convex side of the plastic cylindrical member.

The plastic cylindrical member may be of solid construction, or may be of a hollow construction. Various flexible plastic materials are available for this purpose, for example nylon resins, acetal resins, polycarbonates, polyethylene and polypropylene. The term "plastic" is also intended to include elastomeric materials, such as natural or synthetic rubber, polyurethane, etc.

Each slit is preferably formed by flat planar surfaces which are either of V-shaped configuration or of rectangular configuration when on the convex surface of the plastic cylindrical member. The rectangular configuration produces a lower tendency of the hairs becoming wedged within the slits so as not to be ejected when the slits reopen, but this possibility is substantially reduced by extending the slits only partially around the circumference of the plastic cylindrical member as mentioned above.

Two electrically-driven embodiments of the invention are described below for purposes of example.

In one described embodiment, the partially-slitted member is coupled at one end to the motor, its opposite end being received in a rotatable bearing mounted on a stem projecting axially of the housing. In a second described embodiment, the two opposite ends of the partially-slitted plastic cylindrical member are coupled to the electric motor.

Further features and advantages of the invention will be apparent from the description below.

The invention is herein described, by way of example only, which reference to the accompanying drawings, wherein:

Fig. 1 is a three-dimensional view illustrating one form of depilatory device constructed in accordance with the present invention;

Fig. 2 is an enlarged fragmentary view illustrating the construction of the partially-slitted plastic cylindrical member and the slits therein which are opened and closed during its rotation to receive, pluck and eject body hair growing on a surface over which the partially-slitted member is moved;

Fig. 2a and 2b are enlarged fragmentary views illustrating two possible constructions of the slits in the partially-slitted member of Fig. 2.

Fig. 3 is a sectional view along lines III-III of Fig. 2;

Figs. 4a and 4b are sectional views similar to that of Fig. 3 but illustrating a modification in the construction of the partially-slitted member; and

Fig. 5 illustrates a second embodiment of the invention.

The depilatory device illustrated in Fig. 1 comprises a manually-grippable housing 2, and a hair-plucker body, generally designated 4, rotatably mounted to the housing and rotated by an electric motor 6. This motor is disposed within housing 2 and is energized and de-energized by an electrical switch 8. The rotatable hair-plucker body 4 is in the form of a plastic cylindrical member 10 having one end adjacent or within housing 2 and coupled to the electric motor 6. The opposite end of the plastic cylindrical member 10 is received within a bearing 12 mounted at the end of a stem 14 projecting axially of housing 2. The arrangement is such that the plastic cylindrical member 10 is supported in the form of a small arc, e.g. of about 90° or less, and is rotated about its longitudinal axis as indicated by arrow 18 when motor 6 is energized.

Plastic cylindrical member 10 is of a flexible plastic material and may be of a solid construction as illustrated in Fig. 3. It includes a smooth outer face formed with a plurality of discrete slits 20 extending only partially through member 10. Each slit 20 extends circumferentially of member 10 but for a length less than its complete circumference, preferably for less than one-half its complete circumference.

Fig. 2 is an enlarged fractional view illustrating the slits 20 formed in the outer surface of the plastic cylindrical member 10 when the tube is supported in the arcuate manner illustrated in Fig. 1, and is rotated around its longitudinal axis as illustrated by dotted line 16. Thus, when the plastic cylindrical

member is in its arcuated shape, its outer convex surface 10a is tensioned, and therefore the slits 20 there are opened or widened. On the other hand, the inner concave surface 10b of the plastic cylindrical member 10 is under compression, and therefore the slits 20 there are closed. Accordingly, as the plastic cylindrical member 10 rotates about its longitudinal axis 16 by motor 6, the slits 20 will open at the convex surface 10a of member 10, and will close at its concave surface 10b.

Each of the slits 20 may be, when occupying the convex surface 10a of the slitted member 10, either of V-shape configuration as shown in Fig. 2a or of rectangular configuration as shown in Fig. 2b. In either such configurations, each slit has sides formed with flat planar confronting face, as shown at 20a, 20b in Fig. 2a, or at 20a', 20b' in Fig. 2b. Both such arrangements provide extensive surfaces, when the slits are open, for engagement with the hairs, thereby better assuring plucking-out the hairs particularly the short hairs close to the skin, as compared for example with the known helical-spring arrangement wherein point-contact with the hairs is made by the windings of the spring, rather than extensive-surface contact by the planar-face construction of the slits in the present invention.

Both the V-shaped configuration of slits 20 and the rectangular-shaped configuration of slits 20', illustrated in Figs. 2a and 2b, respectively, whichever is used, are preferably initially made on the outer convex surface 10a of the plastic member as the member is supported in its arcuate position. The rectangular configuration slits shown in Fig. 2b tend to reduce the possibility of wedging of the hairs within the slits after they have opened, and thereby better assure their ejection; however, as pointed out earlier, ejection of the hairs is also better assured by forming each slit for less than the circumference of the cylindrical member 10, preferably for less than one-half its circumference.

The device illustrated in Figs. 1-3 is used in the following manner:

The user grips the housing 2, energizes the electric motor 6 by operating switch 8, and moves the arcuate, plastic, cylindrical member 10 across the skin containing the body hair to be removed. The device is held at an oblique angle to the skin so that the skin contact is made with the surface of the plastic cylindrical member 10 slightly after its convex surface 10a, in the direction of rotation of the member. Thus, member 10 contacts the skin while the slits 20, having reached their fully open positions, are just starting to close. The body hair thus enters these open slits 20, and during the rotation of the plastic cylindrical member, the slits close, pluck out the hair, and then open to eject the hair.

The plastic cylindrical member 10 may also be of a hollow construction, in which case the slits 20 could be for a depth less than the thickness of the hollow tube as shown at 20" and 10" in Fig. 4a, or greater than the thickness of the hollow tube as shown at 20" and 10" in Fig. 4b.

As described earlier, the plastic construction as described above provides a "softer" feel, and less possibility to "pinch" than the helical spring con-

struction when the device is moved across the user's skin to remove the body hair. In addition, making it of plastic reduces the possibility of electrical shock and eliminates the need for a step-down transformer in order to energize motor 6 from the supply mains.

Fig. 5 illustrates another embodiment of the invention, also including a manually-grippable housing 102 and a hair-plucker body 104 mounted to the housing and rotated by electric motor 106 within the housing under the control of an electric switch 108. The hair-plucker body 104 in the Fig. 5 embodiment is also in the form of a plastic cylindrical member 110, solid or hollow, and formed with a plurality of circumferentially-extending slits 120 as in the arrangement described above with respects to Figs. 1-4. In the embodiment of Fig. 5, however, the plastic cylindrical member 120 is supported in an arc of about 180°, and both of its opposite ends are rotated by motor 106. Thus, one end of member 110 is coupled to a gear 130 meshing with another gear 132 at one end of electric motor 106, and the opposite end of member 110 is coupled to another gear 134 meshing with a further gear 136 at the opposite end of the electric motor.

The structure, operation, and advantages of the device illustrated in Fig. 5 are otherwise the same as described above with respect to Figs. 1-4.

While the invention has been described with respect to several preferred embodiments, it will be appreciated that many variations and modifications of the invention may be made. For example, while best results are obtained when the hair-plucker body (10; 110) is of perfect cylindrical configuration, good results are also obtainable when it is merely of generally cylindrical configuration, such as slightly elliptical or polygonal. It will be appreciated that the invention could also be used for other purposes, e.g. removing chicken feathers.

Claims

1. A depilatory device for removing body hair, comprising: a manually-grippable housing (2; 102) and a flexible hair-plucker body (4; 104) of cylindrical contour mounted for rotation about its longitudinal axis to said housing (2; 102); said hairplucker body (4; 104) being supported with its longitudinal axis disposed arcuately and having an exposed section formed with a plurality of gaps (20; 120) in its outer surface which during rotation of said hair-plucking body (4; 104) and its movement over a surface from which hair is to be removed, are open at the convex side of said section to receive the hairs in the gaps (20; 120) and are closed at the concave side to catch, pluck-out and then eject the hairs; characterized in that said hair-plucker body (4; 104) is a cylindrical member of plastic material having a smooth outer surface; and that said gaps (20; 120) are defined by a plurality of slits each penetrating only partially through, and extending circumferentially of, the hair-plucker body (4; 104).

2. The device according to Claim 1, wherein each of said slits extends for less than one-half the com-

plete circumference of said plastic cylindrical member.

3. The device according to Claim 1, wherein each of said slits is formed by flat planar surfaces of V-shaped configuration when in their open condition on the convex side of the plastic cylindrical member.

4. The device according to Claim 1, wherein each of said slits is formed by flat planar surfaces of rectangular configuration when in their open condition on the convex sides of the plastic cylindrical member.

5. The device according to any preceding claim, wherein said plastic cylindrical member is of solid construction.

6. The device according to any of claims 1 to 5, wherein said plastic cylindrical member is of hollow construction.

7. The device according to any preceding claim, further including an electric motor within said housing for rotating said plastic cylindrical member, and an electrical switch carried by said housing for energizing and de-energizing said motor.

8. The device according to claim 7, characterised in that said plastic cylindrical member is coupled at one end to said motor, its opposite end being received within a rotatable bearing mounted on a stem projecting axially of said housing.

9. The device according to claim 8, characterised in that said plastic cylindrical member is supported in an arc of up to about 90°.

10. The device according to claim 7, characterised in that said plastic cylindrical member is supported in an arc of about 180° and its opposite ends are coupled to said electric motor.

11. The device according to any preceding claim, characterised in that said plastic material is selected from one of: nylon resin, acetal resin, polycarbonate, polyethylene, polypropylene, or an elastomeric material, e.g. natural or synthetic rubber or polyurethane.

Revendications

1. Appareil à épiler pour éliminer les poils du corps, comprenant: un boîtier (2; 102), pouvant être saisi à la main, et un corps flexible d'arrachage de poils (4; 104) de contour cylindrique supporté pour rotation autour de son axe longitudinal sur ledit boîtier (2; 102); ledit corps d'arrachage de poils (4; 104) étant supporté de sorte que son axe longitudinal est arqué et comportant une partie exposée pourvue d'une pluralité d'intervalles (20; 120) dans sa surface, extérieure qui, pendant la rotation dudit corps d'arrachage de poils (4; 104) et son déplacement sur une surface dont on veut éliminer les poils, sont ouverts du côté convexe de ladite partie, de manière à recevoir les poils dans les intervalles (20; 120), et sont fermés du côté concave de manière à saisir, arracher puis éjecter les poils; caractérisé en ce que ledit corps d'arrachage de poils (4; 104) est un élément cylindrique en matière plastique présentant une surface extérieure lisse et en ce que lesdits intervalles (20, 120) sont définis par une pluralité de fentes pénétrant chacune seulement partiellement à travers les corps d'arrachage de poils (4; 104) et

s'étendant dans la direction circonférentielle de celui-ci.

2. Appareil suivant la revendication 1, dans lequel chacune desdites fentes s'étend sur moins de la moitié de la circonférence complète dudit élément plastique cylindrique.

3. Appareil suivant la revendication 1, dans lequel chacune des dites fentes est définie par des surfaces planes ayant une configuration en V lorsqu'elles sont dans leur état ouvert du côté convexe de l'élément plastique cylindrique.

4. Appareil suivant la revendication 1, dans lequel chacune desdites fentes est définie par des surfaces planes ayant une configuration rectangulaire lorsqu'elles sont dans leur état ouvert du côté convexe de l'élément plastique cylindrique.

5. Appareil suivant l'une quelconque des revendications précédentes, dans lequel ledit élément plastique cylindrique est de construction pleine.

6. Appareil suivant l'une quelconque des revendications 1 à 5, dans lequel ledit élément plastique cylindrique est de construction creuse.

7. Appareil suivant l'une quelconque des revendications précédentes, comprenant en outre un moteur électrique placé dans le dit boîtier pour entraîner en rotation ledit élément plastique cylindrique, et un commutateur électrique porté par ledit boîtier pour mettre en service et arrêter ledit moteur.

8. Appareil suivant la revendication 7, caractérisé en ce que ledit élément plastique cylindrique est accouplé à une extrémité audit moteur, son extrémité opposée étant reçue dans un palier rotatif monté sur une tige qui fait saillie axialement par rapport audit boîtier.

9. Appareil suivant la revendication 8, caractérisé en ce que ledit élément plastique cylindrique est supporté suivant un arc atteignant 90° environ.

10. Appareil suivant la revendication 7, caractérisé en ce que ledit élément plastique cylindrique est supporté suivant un arc de 180° environ et ses extrémités opposées sont accouplées audit moteur électrique.

11. Appareil suivant l'une quelconque des revendications précédentes, caractérisé en ce que ladite matière plastique est choisie parmi les matières suivantes: résine nylon, résine acétal, polycarbonate, polyéthylène, propypropylène, ou un élastomère, par exemple caoutchouc naturel ou synthétique ou polyuréthane.

Patentansprüche

1. Enthaarungsvorrichtung zum Entfernen von Körperbehaarung, mit einem mit der Hand ergreifbaren Gehäuse (2, 102) und einem biegsamen Enthaarungskörper (4, 104) von zylindrischer Gestalt, der um seine Längsachse drehbar an das Gehäuse (2, 102) montiert ist, wobei der Enthaarungskörper (4, 104) so montiert ist, daß seine Längsachse gebogen ist und einen hervorstehenden Teil mit einer Mehrzahl von Schlitzen (20, 120) an dessen Außenoberfläche aufweist, welche im Verlauf der Drehung des Enthaarungskörpers (4, 104) und dessen Bewegung über eine von Haaren zu befreiende Oberfläche auf der konvexen Seite des Teils offen sind, um

die Haare in den Schlitzen (20, 120) aufzunehmen, und auf der konkaven Seite geschlossen sind, um die Haare zu fassen, auszureißen und dann auszuwerfen, dadurch gekennzeichnet, daß der Enthaarungskörper (4, 104) ein Kunststoffzylinder mit einer glatten Außenoberfläche ist und daß die Schlitze (20, 120) von einer Mehrzahl von Kerben gebildet werden, die jeweils in den Enthaarungskörper (4, 104) nur teilweise eindringen und sich in dessen Umfangsrichtung erstrecken.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß sich jede der Kerben über weniger als die Hälfte des vollen Umfangs des Kunststoffzylinders erstreckt.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß jede der Kerben von ebenen Flächen begrenzt wird, die eine V-förmige Konfiguration bilden, wenn sie sich im offenen Zustand auf der konvexen Seite des Kunststoffzylinders befinden.

4. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß jede der Kerben von ebenen Flächen begrenzt wird, die eine rechteckige Konfiguration bilden, wenn sie sich im offenen Zustand auf der konvexen Seite des Kunststoffzylinders befinden.

5. Vorrichtung nach einem vorangehenden Anspruch, dadurch gekennzeichnet, daß der Kunststoffzylinder massiv ist.

6. Vorrichtung nach einem vorangehenden Anspruch, dadurch gekennzeichnet, daß der Kunststoffzylinder hohl ist.

7. Vorrichtung nach einem vorangehenden Anspruch, die weiter einen Elektromotor in dem Gehäuse zum Drehen des Kunststoffzylinders und einen von dem Gehäuse getragenen elektrischen Schalter zum Einschalten und Ausschalten des Motors aufweist.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß der Kunststoffzylinder mit einem Ende mit dem Motor gekuppelt ist und sein anderes Ende in einem drehbaren Lager aufgenommen ist, das an einen axial aus dem Gehäuse herausragenden Arm montiert ist.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß der Kunststoffzylinder für einen Bogenverlauf bis etwa 90° abgestützt ist.

10. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß der Kunststoffzylinder für einen Bogenverlauf von etwa 180° abgestützt ist und seine entgegengesetzten Enden mit dem Elektromotor gekuppelt sind.

11. Vorrichtung nach einem vorangehenden Anspruch, dadurch gekennzeichnet, daß das Kunststoffmaterial aus einem Nylonharz, Acetalharz, Polycarbonat, Polyäthylen, Polypropylen oder einem elastomeren Material, z.B. natürlichem oder künstlichen Gummi oder Polyurethan ist.

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